# Light and Lighting

XXIX.—No. 2. February, 1936 Price 9



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# Light and Lighting

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## Principal Contents:



## KING GEORGE THE FIFTH

BUT a few months ago, in reviewing the floodlighting display arranged in connection with King George's Silver Jubilee, we touched briefly on the great qualities that had gained for him such esteem and affection—his kindness and sagacity and the steadfast, unassuming courage which supported him during a period of strain and difficulty such as few monarchs can have endured.

One's mind goes back to that wonderful period of mellow sunshine when, night after night, the floodlighted spires stood out against a pearly sky, when the hearts of all seemed to be touched with a new spirit of fellowship and kindliness, and everyone seemed to wish to prolong to the utmost the opportunity of expressing their love and loyalty to the great King who has now passed away.

It is sad that King George should have been granted such a short further period to reign over us, but an inestimable blessing that he lived long enough to learn—what has again been abundantly proved during our period of mourning—how completely he had gained the hearts of his people.


**Can the Camera Lie?—Correct Sequence of Wattages for Electric Lamps—Control of Coloured Lighting—Lighting Installations in Sydney—Automatic Light Recorders for Cricket?—Floodlighting Scotland Yard.**

## *Can the Camera Lie?*

This familiar inquiry of our boyhood must often have occurred to those confronted with photographs of street lighting installations, especially those of the "before and after" variety. Mr. R. G. Hopkinson, whose excellent paper is summarised on pp. 43-44, has no doubt on this point, but he shows in a very thorough manner how, by working on a scientific system, consistent comparative results may be obtained. The essential thing is to preserve the balance of light and shade and reproduce the impression of the eye when the photograph was taken. It is an excellent and most painstaking investigation. We recommend those interested to study the full version of the paper and discussion which appears in the Transactions of the Society. There is, however, one point on which we should like to break a lance with Mr. Hopkinson. One rather gathers that his method has reference primarily to the brightness of the roadway and surroundings—certainly most important, but not the only factor affecting visibility and visual impression.

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## *The Effect of the Sources of Light*

From our own experience of photographing installations by their own artificial light we know how exceedingly difficult it often is to give a fair picture of a lighted room and at the same time to bring out the fittings without undue halation. One would imagine that if care is concentrated mainly on the illuminated surfaces in a street the light sources will have to go and may be more or less lost in flare. Yet is it not true that their appearance does influence the impression one forms of a street by night, and that if they are glaring this must affect to some extent one's judgment of contrast? The same considerations lead one to doubt whether any picture is completely satisfying unless the actual range of contrast in the original can be preserved. This is more easily possible in a lantern slide (with its much greater range) than in a photograph on paper. Certainly illuminated positives of lighting installations are often much more attractive than photographs, partly, no doubt, because a better impression of the brightness of the source of lights can thus be given.

We notice that Mr. Hopkinson has come to the conclusion that any variations introduced by the colour of the light source are not of serious moment as far as photographic results are concerned. We are, however, not quite so sure that they are without effect physiologically. An extensive area illuminated by a source rich in green and blue light may appear to the eye relatively bright at weak illuminations, as the familiar appearance of green grass and red geraniums in the dusk so strikingly illustrates.

### Forthcoming Events.

**Feb. 4th.** Dr. J. W. T. Walsh will deliver the **Opening Address** at the **First Meeting** of the **Photometric Section** of the Illuminating Engineering Society (*At the Westminster Technical Institute, Vincent Square, S.W.1*); **7 p.m.**

**Feb. 11th.** Mr. H. Buckley on **Classification of Lighting Systems**; and Mr. S. F. Dunkley and Mr. W. R. Stevens on **Thermal Tests of Illuminating Glassware** (*General Meeting of the Illuminating Engineering Society to take place at the Institution of Mechanical Engineers, Storey's Gate, St. James's Park, London, S.W.1*); **6.30 p.m.**

**Feb. 18th.** Mr. R. Maxted on **The Application of Subjective Methods to Lighting Problems** (*Meeting of the North Western Area Local Centre of the Illuminating Engineering Society at The Engineer's Club, Albert Square, Manchester*).

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*N.B.*—The **Annual Dinner** of the Illuminating Engineering Society, originally arranged for Feb. 4th has been postponed until **March 24th.** See Notice on p. 51.

## *Visit to the Strand Electric and Engineering Co., Ltd.*

The increasing use of light in dramatic, cinema, and other entertainments, and as an adjunct in the interpretation of music was displayed to members of the Illuminating Engineering Society through the courtesy of Mr. L. G. Applebee in the theatre of the Strand Electric Co., on January 7, when the Strand Electric Console was shown in use.

The Console consists of an organ console of substantially standard construction wired through a low voltage multiple-core jumper cable to a relay board and dimmer banks placed under the stage or in any other convenient position. It is an extraordinarily compact substitute for the heavy immobile switchgear usually associated with stage and theatre house lighting, and it may be placed at any desired position in the house, for example, in the orchestra, which gives the light executant a clear view of the stage and house.

The flexibility of light control which it gives is remarkable and by an ingenious system of couplers and timers for the dimmers it enables very striking coloured lighting effects to be obtained either at the will of the executant or in a preset manner. Scenic lighting, creeping or rapid colour transitions, trick effects with ultra-violet radiation, projected scenery and the use of the cyclorama, together with syncopation in light or even a pure light ballet to a musical accompaniment, were pleasingly rendered by Mr. F. P. Bentham, the inventor of the light Console, and his fellow demonstrators, Miss Audrey Lake and Mr. L. Jordan. The musical items with light accompaniments included themes as widely remote as Wagner's Good Friday music from "Parsifal" (rendered on white draped curtains), an organ toccata by Gigout, and even "hot rhythm."

## *The Correct Sequence for Wattages of Electric Lamps*

To students of lighting technicalities it is a familiar fact (a consequence of Fechner's Law) that doubling the intensity of light does not necessarily double the effect on the eye. In order that the sensation may advance by equal steps we need to ensure not equal arithmetical differences, but equal logarithmic differences in stimulus. This fact forms the basis of most recent codes of values of illumination for different purposes.

The same idea has been developed by J. Schaer, of Berlin, in connection with the sequence of wattages for electric lamps ("Licht und Lampe," January 2). He remarks that it is a common experience—mystifying and disconcerting to the ordinary consumer—that whereas, say, the substitution of a 40-watt lamp for a 25-watt one in a table lamp does bring about an evident improvement in illumination, the substitution of a 75-watt lamp for a 60-watt one may make no apparent difference—even though the light is really increased, as a photometer would show. The explanation is psychological, but, of course, the average consumer does not realise this. His experience merely implants in his mind an idea that the marking of lamps must be wrong!

To remove this source of bewilderment Mr. Schaer suggests that the existing sequence of wattages for electric lamps should be modified. He suggests a series such as the difference in the logarithms of the lumens furnished by successive lamps remains substantially constant. Thus, if each lamp in the series were tried in turn the apparent brightness would increase by equal steps. He exhibits alternative tables based on this idea. The existing standard series would be reduced from 15 to 12 (or 13) different wattages. It is possible thus to proceed in equal steps for a series of lamps consuming from 15 watts to 4,000 watts.

# Lighting Installations in Sydney (New South Wales)

We are greatly indebted to Mr. A. Turnbull, of the New South Wales Dept. of Railways, for the two illustrations below showing up-to-date lighting effects in Sydney. Mr. Turnbull also sends us several other pictures—and a very pleasing Christmas Card from his department featuring the old stage coach.

N.S.W. ROYAL AGRICULTURAL SOCIETY SHOWGROUND, SYDNEY.

This photograph shows but a small section of the showground, which covers approximately 45 acres. On the left is seen one of the latest steel towers which support a bank of eighteen (18) 1,000 watt floodlighting units. A number of these towers illuminate the oval, which is shown on the left of the picture. The Royal Agricultural Society Showground is an outstanding monument to the progress of New South Wales, and is a wonderful advertisement for spectacular night lighting and flood lighting. The showground was quite a striking spectacle, especially when viewed by night from a high and distant viewpoint as in the photograph.


SYDNEY HARBOUR BRIDGE, SOUTHERN APPROACH.

This picture is interesting for the sky sign on the left. The wording "GOODYEAR" is carried out in Zonarc tubing operated direct on a 240-volt D.C. supply, an entirely local development with luminous gaseous discharge. The increased brightness as compared with the ordinary high voltage tubing is most striking. The sign on the right at intervals changes the brand of the health giving drink advertised, which explains the hieroglyphics on the bottom line.

The picture also indicates the effectiveness of the Holophane two way Non Axial bowl type refractors enclosed in the lanterns lighting the roadway.

## *Automatic Light Recorders and Cricket*

Controversy has once more arisen in connection with the decision of "bad light" in cricket matches—on the occasion of the recent Test Match between Australia and South Africa. Such arguments will no doubt always recur so long as the point when play becomes impracticable is decided simply by opinion, however experienced. Arthur Mailey, the former Australian Test bowler, who is now a journalist, suggests the use of automatic light recorders to determine the "grumble point." We have heard that such apparatus was tried at Lord's, but did not give satisfaction—perhaps because players were still disposed to back their own opinion. To our mind a test based on the available illumination (or what is practically the same thing, the average sky brightness) ought to be preferable to reliance on personal impressions.

## *Importance of Contrast*

In commenting on this question some time ago we remarked that complaints of bad light on the cricket field would be much less frequent if two simple steps were taken: (a) the provision of white sighting boards at *both* ends of the ground; and (b) the maintenance of adequate brightness of them by artificial illumination with concealed sources (preferably giving a light visually resembling daylight). So far as the batsman is concerned, the problem resolves itself largely into adequate contrast between ball and background. The same idea is worth consideration on football grounds where visibility is often poor at this season of the year. Towards the end of the game the ball may become completely invisible to spectators, whilst the figures of players darting hither and thither can still be seen. It would help considerably (a) if a ball light in colour were adopted; and (b) if the mud were washed away occasionally—or, better still, a new ball furnished at intervals (as is usual in hockey). In such circumstances skilful artificial illumination as a supplement to daylight might be worth consideration. Anyhow, is it not amazing that this question of visibility receives so little attention from the authorities—seeing that the whole value of professional football as a spectacle vanishes when the crowd cannot see what is happening?

WARKWORTH CASTLE, NORTHUMBERLAND.

A striking example of Floodlighting with Philora sodium and mercury lamps. The main portion of the building is illuminated with orange light; the central tower appears by contrast pale blue.

## *Floodlighting Scotland Yard*

We hear that experiments with floodlighting have recently been made in Scotland Yard (London). The object is primarily to enable "flying squad" cars to get away more quickly, and the simple method adopted, of mounting two 500 watt projectors under the bridge connecting the Yard with Cannon Row police station, ought to answer the purpose quite well. Incidentally, says the "News Chronicle," the extra lighting should help officers to prevent unauthorised access to the Yard—for example in checking motorists who find the Yard a convenient short cut between Whitehall and the Embankment!

## Any Books To Bestow?

### For the I.E.S. Library.

Readers are reminded of the effort being made by the Illuminating Engineering Society to assemble a representative collection of books on Illumination, Photometry and Allied subjects, to form the basis of a Library for the use of members.

Contributions to the fund now being raised, or offers of books, will be welcome.

Works of historic interest, which are likely to become more and more difficult to obtain in the future, are particularly desired.

## Any Questions to Ask?

### Next I.E.S. Informal Meeting, March 31.

The next I.E.S. **Informal Meeting** (originally fixed for February 28) has been deferred to **March 31.** It will be run on the lines pursued so successfully at the first meeting of the kind held last November, and will be devoted to **"Questions and Answers."**

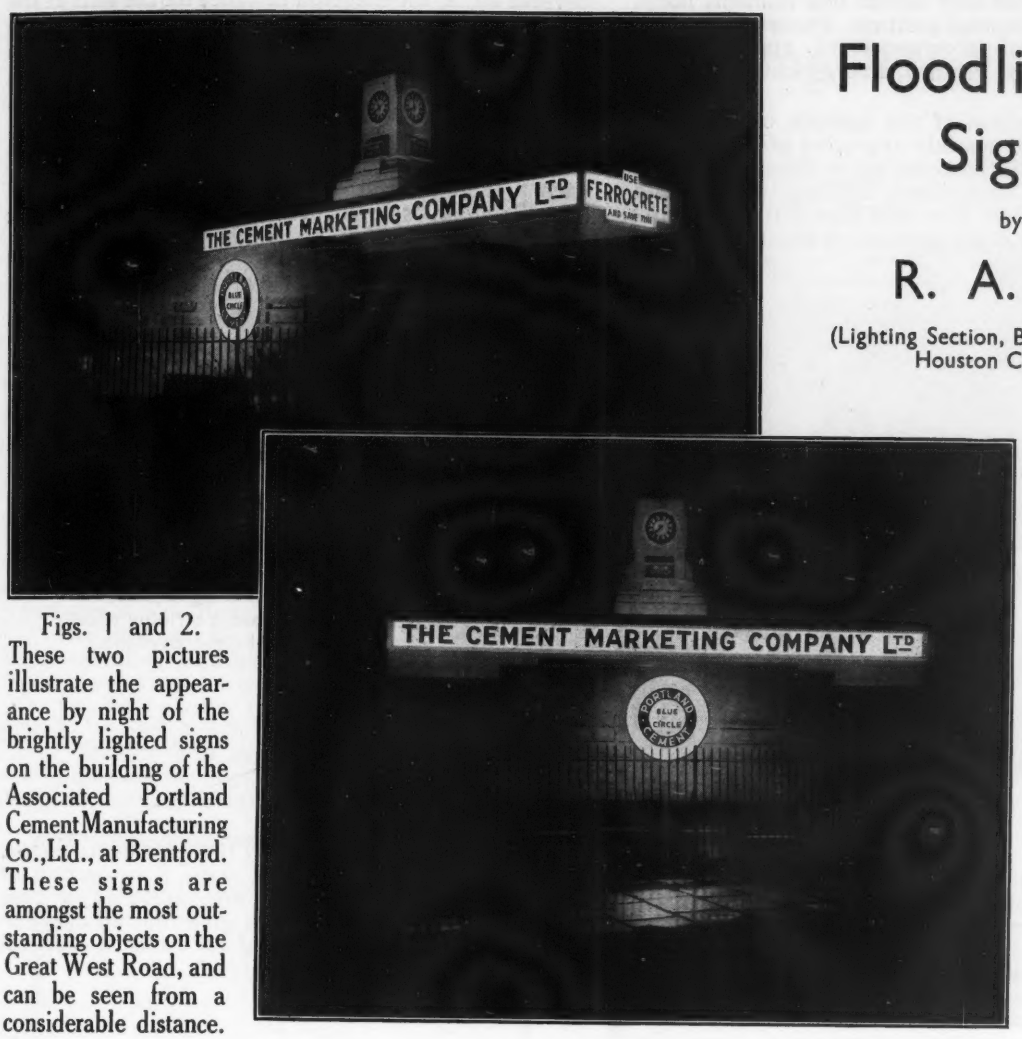
If any members, young or old, have any interesting or knotty problems requiring solution (or, better still, out of the way questions to which they know effective answers) will they please send them in to the Honorary Secretary, who is now collecting "posers."

# Floodlighted Signs

by

R. A. Ives

(Lighting Section, British Thomson-Houston Co., Ltd.)




Figs. 1 and 2. These two pictures illustrate the appearance by night of the brightly lighted signs on the building of the Associated Portland Cement Manufacturing Co., Ltd., at Brentford. These signs are amongst the most outstanding objects on the Great West Road, and can be seen from a considerable distance.

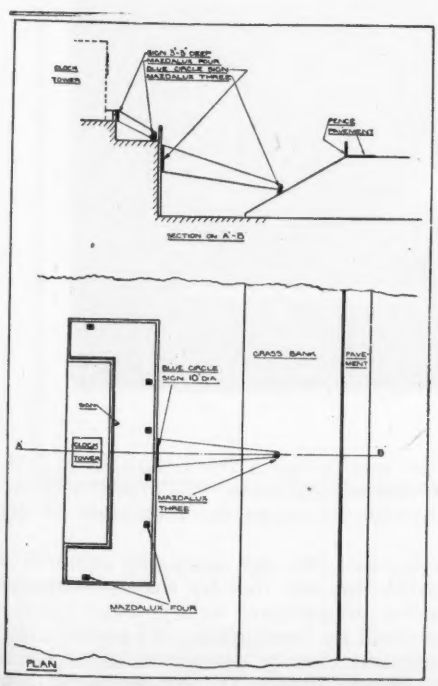



Fig. 3. Plan and Sectional View showing position of floodlighting equipment.

IN the Middle Ages travellers on the roads welcomed the faint lights of the distant inn. Dick Whittington, entering by the Great North Road paused and gazed upon the "Lights o' London."

Even so the traveller of to-day, approaching London by railway train, or motor car, becomes aware of his approach to the great city, by lights of far greater power which are visible long before even the outskirts of the city are reached. Outstanding amongst these announcers in light are the illuminated signs which figure prominently on some of the arterial roads leading into London. There can be few advertisements more effective and, considering everything, less costly in comparison with their value.

### Striking Signs at Brentford.

A striking example is afforded by the great floodlighted signs of the Associated Portland Cement Manufacturing Company, Ltd., illustrated above (Figs. 1 and 2). Being of imposing size, highly legible and brightly illuminated, these signs can be readily distinguished from afar. The front sign below the clock tower is approximately 73 ft. long and 3 ft. 3 in. deep. It continues at each end of the building, the extension occupying an area 17 ft. long and 4 ft. deep. The material is vitreous enamel steel on which letters are printed, painted blue on a light yellow background.

A balcony roof, 10 ft. below, encloses that portion of the building on which the sign is mounted, the roof extending 16 ft. in front and 13 ft. at the ends. Concealed behind the balcony wall six Mazdalux

Four floodlights are installed on the roof, each being equipped with a 500-watt Mazda line filament lamp, operating in a horizontal position. These units afford a wide horizontal divergence of approximately 80°, with a narrow vertical divergence of approximately 12°.

By careful selection of the position of the floodlights, it was found possible to project practically the full flux of light in the beam on to the signs, giving a resultant effect of uniform lighting, with a high level of illumination. The dark blue lettering of the sign stands out in sharp contrast to the light yellow background—the choice of complementary colours proving a very satisfactory one for the purpose.

Fig. 3 shows a plan and sectional view of the floodlighting equipment in relation to the sign. It will be seen that the long sign is floodlighted by means of four floods, spaced 18 ft. apart, with a projection of 14 ft. from the wall on which the sign is mounted. One floodlight is used for each of the two end signs, and is located centrally, with a projection of 11 ft.

On the front wall of the building just below the level of the balcony roof, a 10-ft. diameter Portland cement blue circle sign is located. This is likewise of vitreous enamel steel with blue letters painted on a yellow background.

It is floodlighted from a Mazdalux Three long-range projector, having a beam divergence of approximately 12°. The projector (see Fig. 3) is mounted on a concrete base, and is located on a sloping grass-covered bank, the diagonal distance on the axis of the beam being approximately 46 ft., this distance being so calculated that the beam just covers the sign, and the full beam lumens are concentrated thereon.

### The "Virol" Sign at Ealing.

At Hanger Lane, Ealing, on the roof of Virol, Ltd., there is a gilt letter "Virol" sign. The five letters are each 8 ft. high, and are so spaced that the total overall length is 30 ft. This sign (Figs. 4 and 5) is floodlighted by means of five Mazdalux floodlights, each being equipped with two 100-watt pearl lamps; suitable supporting brackets, with a projection of approximately 2 ft. 6 in., are provided at the base of the sign. These floods give that an approximate horizontal divergence of 80° and a vertical divergence of 30°.

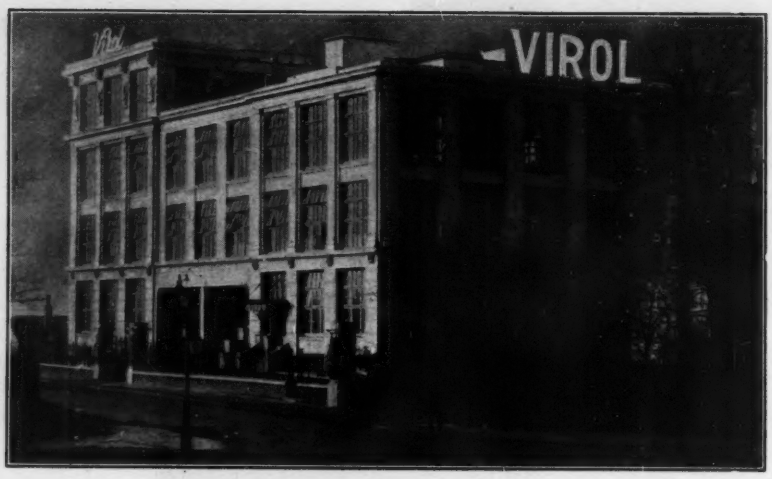



Fig. 4. A Daylight View of the "Virol" sign at Ealing. The letters are 8 ft. high, and the whole series occupies a length of 30 ft. The letters, being executed in gilt, have a striking effect in bright daylight.

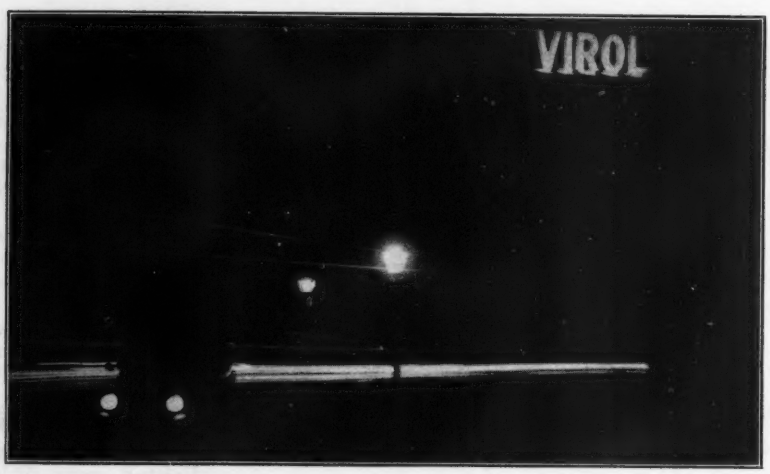



Fig. 5. A Night View of the same building. The sign is illuminated by five Mazdalux floodlights, mounted approximately 6 ft. apart. The effect of the gilt sign, against its dark background, is even more vivid at night than by day.

The intention was to space the floodlight at 6-ft. intervals, but this arrangement has been slightly modified in practice owing to the formation of the letters.

During the daytime the sign is clearly defined in silhouette against the sky, and by the reflection of sunlight from the gilt surface.

At night the effect by floodlighting is very striking. The sign stands out clearly against its dark background, and is clearly visible at long distances over a considerable area of the surrounding district.

# Photographs of Street Lighting Installations

We give below a summary of Mr. R. G. Hopkinson's recent paper, in which he outlines a scientific method of taking photographs of street lighting installations, *so as to show them as they actually appear!*

IT was a happy idea to arrange for Mr. R. G. Hopkinson's paper on the above subject to be read at a joint meeting of the Illuminating Engineering Society and the Royal Photographic Society of Great Britain. The latter acted as hosts, and their hall in Russell-square was completely filled by a keen and appreciative audience. The discussion was opened by contributions from two members of the Illuminating Engineering Society (Mr. G. H. Wilson and Mr. F. C. Smith), who were followed by two members of the Royal Photographic Society (Mr. F. F. Renwick and Mr. E. R. Davies), both of whom furnished most detailed and informative comments on the somewhat intricate subject of the paper.

It will be recalled that Mr. Hopkinson's paper gained the Society's Silver Jubilee Commemoration (1934) Award—first presented last year. It deals with a question of importance in connection with all forms of lighting installations, but is specially vital

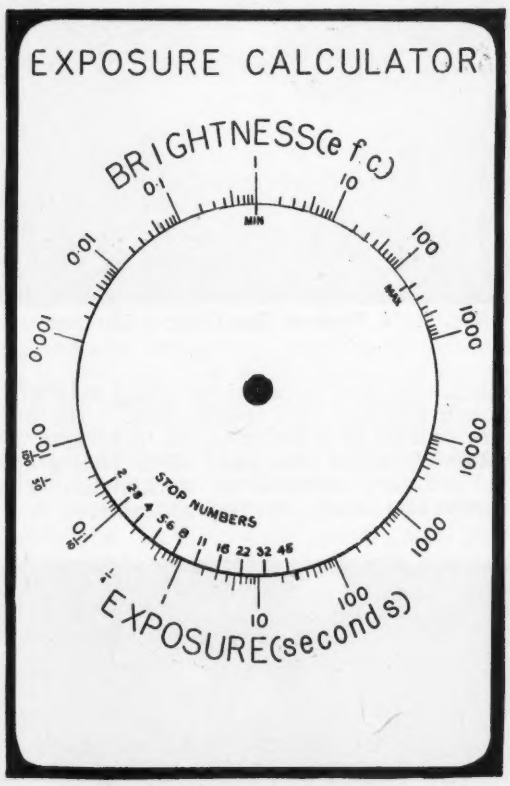



Fig. 2. Exposure Calculator.

in the case of public lighting. Everyone is aware that photographs (even "untouched" photographs) of street lighting installations may prove a snare and a delusion. The appearance of such a photograph may be completely altered by modifying the exposure, development, and conditions of printing, and there is a natural temptation to aim at a photograph which gives the best pictorial effect rather than a faithful reproduction of the conditions. In the case of "before and after" pictures comparative photographs may be completely misleading—even if, as is sometimes asserted, the exposure is the same in each case.

Fig. 1. Brightness Meter.

### A Logical System.

Mr. Hopkinson, therefore, in his paper sets out to devise a logical system of representation, based on first principles, such as that prints will give a qualitative record of installations as well as being mutually comparable. Such photographs, be it noted, may not always make the most attractive pictures. Furthermore, a "true representation" photographic print will almost always appear somewhat darker than one would expect—owing to a peculiar trick of memory which causes one's recollection to be flattering to an installation.

Now a photograph *can* be a faithful reproduction of a scene. Photographic representations of a brilliantly lighted snow scene, a dark interior of a house, or a dimly lighted street at night, may all convey an accurate impression of the original—even though a range of subjects includes brightnesses varying from 100,000 to 1. Furthermore, any of the prints can be viewed under a wide range of illuminations (from low power interior lighting to summer sunlight) with little change in the impression. This apparently contradictory state of things is due to the remarkable powers of adaptation of the eye.

It is not necessary, therefore, for printing papers to reproduce quantitatively the whole range of brightnesses encountered, but they *should* reproduce, as nearly as possible, the range of brightness that the eye can perceive. Naturally, some detail must be lost in the shadows and in the highlights. But if the same amount is lost in each, a balance, giving the truest representation possible, is obtained.

## I.E.S. Transactions No. 2

Mr. Hopkinson's paper, and the ensuing discussion, is reproduced in full in the second (February) issue of the Transactions of the Illuminating Engineering Society. Copies have been distributed to all members of the Society, and are obtainable by others at the price of 1s. 6d. per copy (post free).

### True Representation.

For true representation the following conditions are specified:—

Firstly, the photograph must be viewed from such a distance that the subject is seen in correct perspective.

Secondly, the brightness gradation on the print must be the same as in the subject.

Thirdly, the detail visible in the highlights, and also in the shadows, should be strictly comparable with that visible in the subject.

These conditions were analysed in great detail by Mr. Hopkinson who showed how they could be met approximately by care in each stage of the processes of exposure, development, and printing. The brightness of the installation may be explored by means of the Brightness Photometer (Fig. 1). The exposure may then be determined by the Calculator shown in Fig. 2, which is based on the study of brightness range (a photo-electric meter is not suitable for street lighting work). He has found that, if panchromatic plates are used, no allowance for the colour of the light from the illuminant is needed. The most satisfactory method of development for street lighting photography is the time and temperature method. Films or backed plates must always be used. Fast panchromatic plates and films which meet sufficiently well the combined requirements of speed, freedom from liability to fog, latitude, uniform sensitivity to all visible radiation and absence of objectionable grain. The process of printing must likewise be done on scientific lines, and this is aided by the Print Exposure-Density Calculator devised by the author.

Mr. Hopkinson gave the following summary of the technique of his process:—

### Summary of Procedure Involved in the Technique.

The foregoing procedure can be summarised in the following eight steps:—

1. Set camera at average eye-level (5 ft.).

2. Measure maximum and minimum brightness of the road surface. Note carefully, preferably on a sketch, where the area of minimum brightness occurs.

3. Set the exposure calculator to straddle the brightness range of the street, and read off the correct exposure for the stop used.

4. Develop for the time which gives correct contrast with the developer and method of development used.

5. Arrange, by enlarging if necessary, that the focal length of the equivalent lens system of the final print is the same as the distance from which the print is to be viewed.

6. Use soft bromide paper or extra soft gaslight paper.

7. Set the measured minimum brightness to the arrow on the fixed base of the exposure-density calculator. Set the exposure scale on 1.

8. Make a trial print, noting the time of exposure and developing fully. Place the calculator over the area of minimum brightness on the print, and find the modification necessary to the exposure. Using this modification, make the final print.

***The three illustrations in the adjacent column show how easily the appearance of an installation may be altered.***

Fig. 4. True Representation of a Street Lighting Installation.

### Press Reproduction.

Of special interest is the effect of reproduction of photographs by means of half tone blocks. Naturally, half tone reproduction is less perfect owing to the more limited range of contrast attainable as compared with good gaslight and bromide papers (possibly only 10:1 as compared with 50:1). The

Fig. 5. A Print of Too Great a Contrast.

drawback can be minimised by using selected art paper and printing with special care. The photogravure process of printing seems to present some advantages from the standpoint of the photographer, but for ordinary reproduction work it has certain drawbacks and is not always practicable.



Fig. 6. A Print of Too Great a Density.

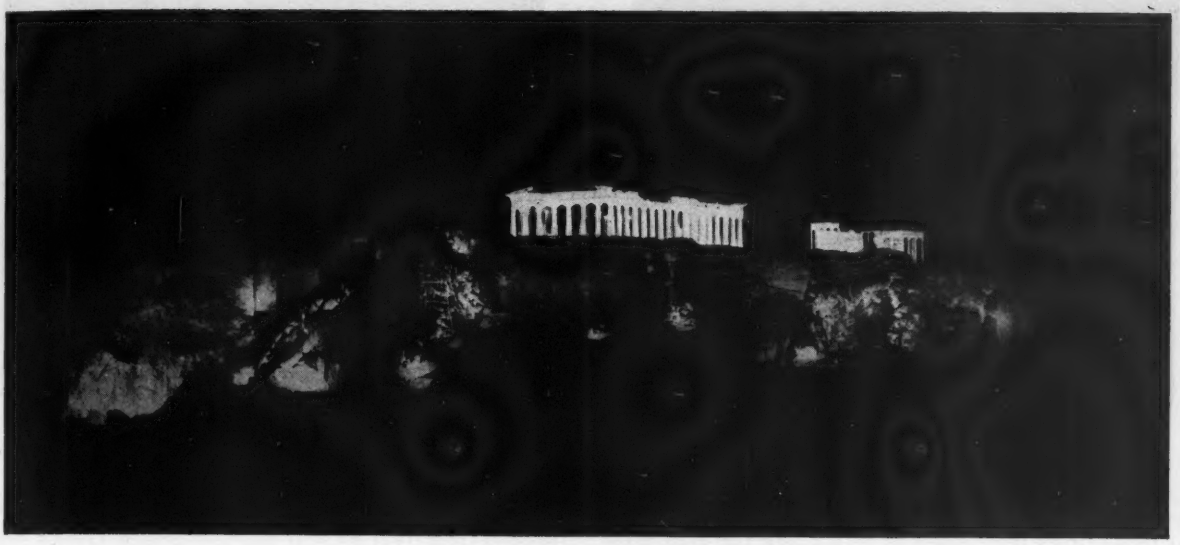


Fig. I. The Acropolis Rock, Parthenon and Erechtheion, Athens, floodlighted on the occasion of the return of King George II. of Greece.

# Floodlighting in the City of Athens

ONE of the most interesting—and most debated—applications of floodlighting is for the illumination of ancient and historic buildings. Some of London's historic buildings were illuminated during the celebration of King George's Silver Jubilee last year. Another striking instance has been afforded by the City of Athens which was floodlighted on an impressive scale on the occasion of the recent return to his country of King George II. of Greece.

We are indebted to Mr. P. M. Bennett, of the Athens Piraeus Electricity Co., Ltd., for some notes on the arrangements and for a series of excellent photographs, some of which are reproduced herewith. Athens is, of course, rich in monuments of the past. Amongst the objects floodlighted were the Rock of the Acropolis, the Parthenon, and Erechtheion, the Temple and Columns of Jupiter, Hadrian's Arch, the Column of Lysicratus, the Zappeion building, fountain, and gardens and the Churches of Eleftheriou and Capnicarea. In these installations a total power consumption of about 116 kw. was involved.

Various other objects which lined the route taken by the King, such as the entrance to the Stadium, the Unknown Warrior's tomb, and the Old Palace, and the triumphal arches through which the procession passed, were also floodlighted. On the hill of Lycabettus a crown and the King's initials were outlined in neon.

One is glad to see that this enterprising action on the part of the Athens Piraeus Electricity Company, who planned the floodlighting as a gesture to the town, was duly recognised. In an appreciatory letter of congratulation the Mayor of the City (Mr. C. Codjias) remarked on the most successful lighting display.

As often happens in such cases difficulties of which the public was unaware had to be overcome. Notice of the desired floodlighting was received only a week previous to the entrance of the King. The stocks of floodlighting projectors in Athens were soon exhausted. The 120 projectors available were insufficient for all the buildings, and accordingly 100 petrol tins, equipped each with a porcelain socket and fitted

Fig. 2. Hadrian's Arch.

Fig. 3. The Stadium Entrance.

Fig. 4. The Church of Capnicarea.

with a 300 watt lamp, were pressed into service. Fifty of these units were used to illuminate the Zappeion building, fountain and gardens, and twenty-nine for the Church of Capnicarea. Trailing Callendar's ancalite, buried in the ground, were led to each of these units. Additional impromptu equipment took the form of oil barrels cut in half which were cleaned up and repainted with aluminium paint. These half-barrels served to conceal 1,000 watt lamps, and were used with good effect. For the Temple of Jupiter the Columns of Jupiter, and Hadrian's Arch, in all twenty-one barrels and eight petrol tins were used.

Fig. 5. Typical G.E.C. Projector with 500 watt lamp. Only half the requisite number could be obtained in time.

Fig. 6. Small petrol tins housing 150 watt lamps—used to meet the emergency shortage in equipment.

Fig. 7. Half an oil barrel, the inner surface coated with aluminium paint, containing three 1,000 watt lamps.

# The "Parkinson" Horizontal Illumination Chart

We reproduce on the opposite page this ingenious and useful chart, which was exhibited by Mr. W. J. C. Davey at the opening meeting of the Illuminating Engineering Society in October last.

The chart has been devised by the Parkinson Gas Lighting Research Bureau for the simpler solution of the well-known equation:—

$$E = I\phi \cos^3\phi / H^2$$

where E=the horizontal illumination in foot-candles

$I\phi$=the candle-power at the vertical angle $\phi$

and H=the mounting height of the lamp, i.e., the height of the light source.

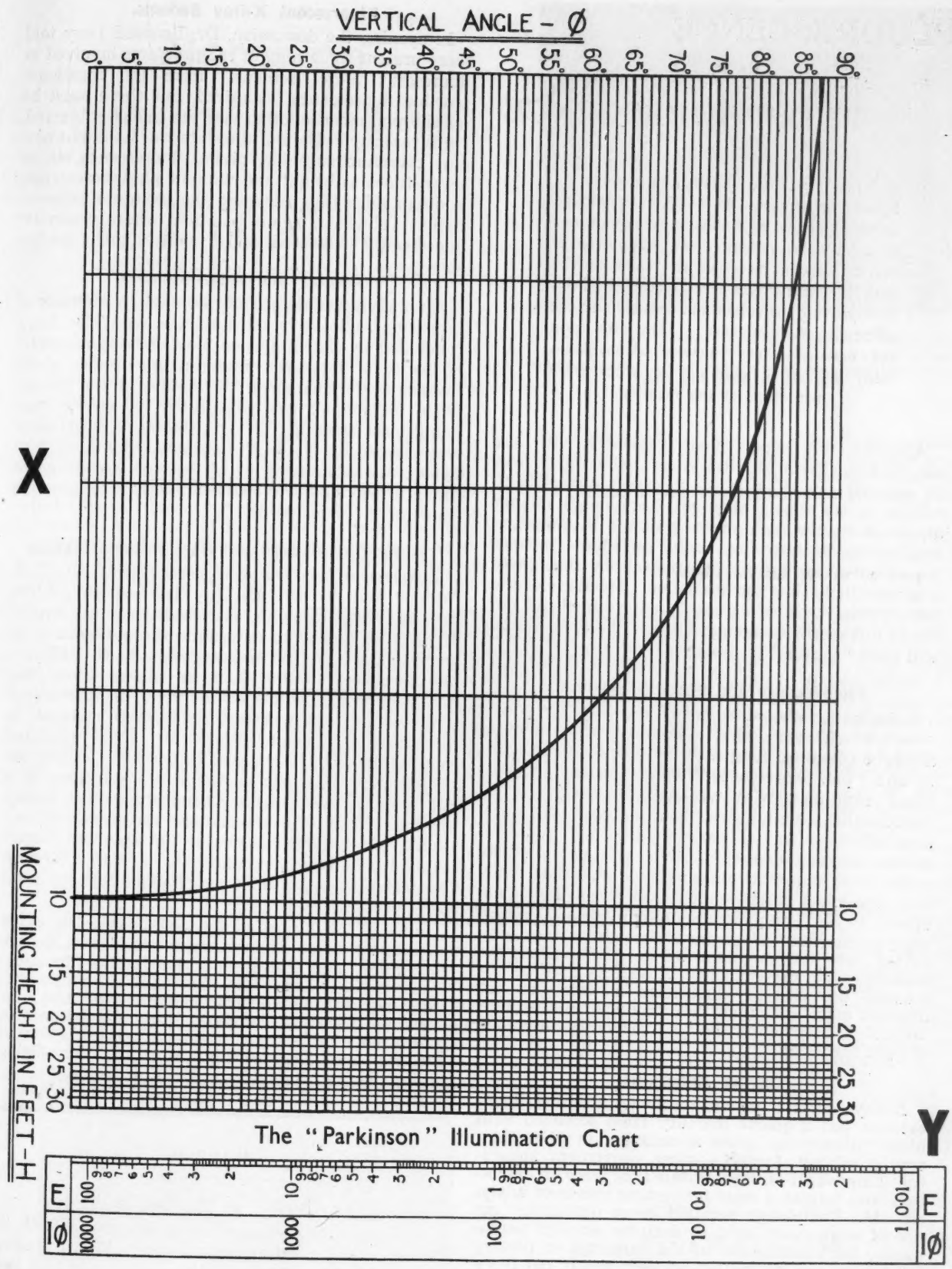
It consists of a grid, X, upon which the logarithms of $\cos^3\phi$ are plotted against the vertical angles $\phi$. At the bottom the mounting heights are represented as horizontal lines spaced at intervals varying as the logarithm of the square of the height.

Below (as a separate diagram Y), a four-cycle logarithmic scale is provided, the divisions representing foot-candles of horizontal illumination (E) and also candle-powers ($I\phi$).

For the determination of horizontal illumination, given the mounting height, vertical angle and candle-power at that vertical angle, the scale Y is placed along the vertical line of X, representing the vertical angle so that the intersection of the curve on the grid coincides with the candle-power on the scale. The horizontal illumination is then read off at the intersection of the scale by the horizontal line representing the mounting height of the lamp.

If a given horizontal illumination is made to coincide with the horizontal line representing the mounting height, the candle-power necessary to give that illumination is shown at the intersection of the scale by the curve on the grid.

Suppose, for example, that we are dealing with lamps mounted 20 feet high. Next assume that one wants to know the illumination at a certain point in the street, such that the angle ($\phi$) between the horizontal and a line drawn from this spot to the source of light is 50°. One first looks at the polar curve of the lighting unit in question, and finds, say, that the candle-power at the angle $\phi$ is 575. One next places the Scale Y (which has previously been cut out from the page) along the vertical line on the diagram X representing 50 and slides it along until the intersection of the scale and the bold curve occurs at a point on the scale corresponding to 575 c.p. (In doing so one can make use of the divisions on the upper (E) scale, bearing in mind that I is equivalent to 100 c.p.) The final step is now to select the horizontal




line for the specified height (20 feet) and observe that this intercepts the scale E at 0.38 foot-candles.

The same procedure can be applied for calculating the test point illumination by merely doubling the candle-power of equal and symmetric units, or, if the two lamps illuminating the test point are not identical, adding their candle-powers together.

Wherever it is necessary to make a large number of determinations of horizontal illumination, this chart should simplify the work considerably.

**For the convenience of readers we are reprinting the diagram on this page on stiff cardboard, so that the scale at the bottom can be easily removed and used, in conjunction with the graph above it, for calculations in connection with Street Lighting, etc.**

**Copies of the chart thus reprinted will be furnished to any readers interested at a nominal price of 2s. 6d. (post free).**

# FLUORESCENCE AND PHOSPHORESCENCE

**At a meeting of the Illuminating Engineering Society on January 14, Mr. F. E. Lamplough opened a fascinating discussion on applications of ultra-violet radiation and its power of causing certain materials to "shine in the dark." These effects have great possibilities in improving the colour and possibly also the efficiency of illuminants. They also form the basis of a new method of analysis—many interesting examples of which were mentioned at the meeting.**

Although his paper dealt generally with the nature and effects of ultra-violet radiation, it was its singular power of causing certain materials to "shine in the dark" that Mr. Lamplough mainly discussed at the last meeting of the Illuminating Engineering Society. His useful introductory paper led to so many special demonstrations that there was very little time for discussion. Members of the Society who were so agreeably entertained did not regret this sacrifice—though some of them, no doubt, will have "posers" to present in writing.

### Fluorescence and Phosphorescence.

A distinction should be drawn between "fluorescence," which means that a body emits light of a different colour so long as the radiation falls upon it, and "phosphorescence," which means that the effect continues—with weakening intensity—after the stimulus is withdrawn. The former is the more usual effect—in fact, almost everything will fluoresce in some degree if exposed to sufficiently strong ultra-violet excitation. With some selected materials, however, the effect is very much more vivid than with others, as Mr. Lamplough showed by several pleasing experiments. When invisible light is thus converted into visible light we get "something for nothing" and the efficiency of sources may be increased—provided the fluorescent materials do not obstruct more light than they produce. But a more hopeful development is their use to modify the colour of light furnished.

### Testing Apparatus.

X-Rays form a potent means of exciting fluorescence, but a quartz mercury lamp screened with black "ultra-violet" glass, as embodied in the modern testing cabinet, forms a more convenient apparatus. Lamps and cabinets of this type were on exhibition, and furnish a most interesting means of analysis. Mr. Lamplough recalled many instances: the use of ultra-violet light to decipher ancient parchments, the examination of old paintings or pottery for repairs, the distinction between newly cut ivory from old, between butter and margarine, etc. In all such cases differences which are imperceptible by ordinary light may be revealed when fluorescence is excited. Equally striking is the use of fluorescent effects for display and advertisements. Costumes which glow in the darkness add effect to a dance, ghosts can be made miraculously to appear and disappear. Effective use of fluorescence was made in the film production of H. G. Wells's "Invisible Man."

### Fluorescent X-Ray Screens.

In opening the discussion, Dr. Leonard Levy told those present something of the problems involved in fluorescent X-ray screens. Here the maximum possible fluorescence is desired, but there must be no phosphorescence, otherwise the image is blurred. Until recently cadmium tungstate was used, but now zinc cadmium sulphide, giving fluorescence six or seven times as bright and without phosphorescence, is obtainable—thus reducing the exposure substantially. Television, again, is a field where maximum fluorescence is desired, and a white light is preferable.

### Display and Advertisement.

After giving some account of modern methods of preparing radioactive self-luminous paint, Dr. Levy concluded by showing some most striking examples of the use of fluorescent materials for display advertisements, the change in the nature of the picture when ultra-violet was substituted for visible light being most striking. Other exhibits of this nature were shown by Mr. F. P. Bentham, who donned an apparently white coat, which became a vivid green under ultra-violet, and also exhibited a most pleasing fluorescent "drop curtain."

### Testing Old Masters and Rare Postage Stamps.

Instances of analysis were described by Mr. C. H. Wright and by Dr. H. J. Plenderdeith, of the British Museum, who described how ultra-violet light often helped to determine the authenticity of prints, drawings, and bronzes. Mr. F. H. Vallency, the president of the London Stamp Club, had promised to give a talk on the value of fluorescence in detecting forged or repaired postage stamps. In his absence through illness Mr. Dow exhibited several specimens furnished by Messrs. Harmer, the well-known philatelic auctioneers. A forgery of a £1 King Edward Sierra Leone stamp was barely distinguishable from the genuine variety in ordinary light, but utterly dissimilar in the ultra-violet cabinet. Similarly repairs to a rare Western Australian stamp in the form of added corners, could be seen.

Much of the interest of the evening was due to the striking exhibits. Thanks are due to Messrs. Kelvin, Bottomley, and Baird, and the British Thomson-Houston Co., Ltd., for the loan of lamps and cabinets; to the General Electric Co., Ltd., for showing discharge lamps utilising fluorescence to gain a remarkable range of colours, and to the Strand Electric and Engineering Co., Ltd., for fitting up the display conducted by Mr. F. P. Bentham.

## Obituary.

### Major G. H. Spittle

We regret to announce the death of Major G. H. Spittle, who passed away on January 17 at the early age of fifty-five. Major Spittle, who since 1924 had acted as Lighting Assistant to the Chief Engineer of the Great Western Railway, represented the British railways on the International Illumination Commission and also served on various B.S.I. committees concerned with lighting. He was for some years a member of the Illuminating Engineering Society. His genial and attractive personality gained him many friends, by whom his untimely death will be deplored.

# Notes on Public Lighting

## The Kingston By Pass—Pools of Darkness—A Five Years' Plan in Hereford—Are Smooth Surfaces Good for Lighting?

Blackfriars Road, London, lighted by South Metropolitan "Supervia" high pressure gas lamps; mounted 22 ft. 6 in. high spaced 100-110 ft. apart; centrally suspended across road (56 ft. wide), two lamps on each span.

There have lately been many references to public lighting in the daily Press. In the course of a recent inquest at Wimbledon the jury remarked on the bad lighting of the Kingston by-pass. At Kingston-on-Thames another jury has asked its recommendation, that proper lighting should be introduced on this by-pass, should be presented to the proper authority. But who is "the proper authority"? The by-pass traverses the areas of four urban authorities—all of whom declare that the expense of adequately lighting the by-pass is beyond them. This is obviously a typical problem for the M.O.T. Street Lighting Committee, whose final report is anxiously awaited.

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The "Evening Standard," from which we quote the above, recalls the description of the lamplighter as "the man who knocks holes in the darkness." It is to be feared that a great deal of public lighting still literally merits this description. The "pools of darkness" still found on arterial roads are doubtless responsible for not a few accidents. Mr. George H. Davies, Lighting Superintendent to the Corporation Gas Works, Hereford, in a recent address to the Hereford Rotary Club, recalled the suggestion that a part of the cost of such public lighting should be met out of the National Exchequer. "The lighting of the King's High Way" is a matter of national consequence.

A Section of the Route Napolean at Grenoble; recently illuminated by "Philora" Sodium Lamps.

Mr. Davies, who sends us a copy of this address, mentions that his Lighting Committee has been occupied with a Five Years' Plan, covering about ten miles of streets, and comprising high and low pressure gas lighting. The first part of the scheme, with 1,500 and 2,000 c.p. high-pressure lights, has been nearly completed. The lighting is well up to Class D. standard of the British Standard Specification.

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The black colour and to some degree the high polish of modern road surfaces are often spoken of as drawbacks from the standpoint of the illuminating engineer. Even so, does he prefer that the surface should be smooth or uneven? Pictures of road surfaces in Aberdeen and other Scottish cities have shown how the small facets of the granite sets tend to give brightness even when wet. If the surface is very smooth is not the tendency to "pools of darkness" greater? This remark is prompted by the statestatement of Mr. A. Donald Paterson in "Roads and Road Construction," that the Honing method of smoothing out all small bumps and inequalities is proving very effective. The complete absence of even small irregularities might not be entirely helpful to uniform road brightness.

The L.C.C. Parapet, Lambeth. Lighting by 250 watt. HPMV Electric Discharge Lamps in original parapet fittings.

**£100,000,000** is to be spent on a Five Years' Plan for **Road Improvement.**

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**How much** of this **for Lighting?**

# Lighting in Moscow

by

W. G. Raffé, A.R.C.A., F.R.S.A.

The "Metro" Underground Luminous Signs—Street Publicity—Novel Methods in the Theatre, etc.

Entrance to the Kropotkinskaya Square Metro Station; the entrance is illuminated by the luminous panels set on the inner surface of the Central Arch.

ARTIFICIAL LIGHTING in Moscow is improving rapidly and widely in domestic, technical, and artistic directions, and future developments await only acquisition or manufacture of further technical equipment and production of more current. Street lighting is normally brilliant and adequate, while the illumination to be seen on the recently opened "Moscow Metro" will bear comparison, both for brilliance and elegance, with any similar installation to be found elsewhere. (The photographs of the "Metro" which accompany these notes hardly do full justice to the degree of luminosity attained.)

### Luminous Signs.

Signs are increasing in number, most evident being the huge letters of the "M," which is carried on every one of the street stations of the Metro; sometimes two are there, with the word "M E T R O" in full. They are usually box signs, brightly painted and fitted with dual neon strips to outline them at night. In some stations external lighting is developed to a decorative degree, as at Kropotkinskaya-square (illustrated), the central arch of which fulfils the architectural function of carrying underneath a series of glass-panelled boxes which provide illumination for the entrances, quite free of any obstruction from falling snow or rain or ice formation. The tunnels of the "Metro" are kept illuminated along their entire length; there are no dark patches. Store display is also developing in its lighting aspect, both in windows and within. Windows not required to show goods are often rented out to the various organisations which seek publicity, such as theatres or cinemas or concerts; they install a model or pictures which are lighted at present in simple modes. There is nothing outstanding in this direction, for most windows are not large.

### Street Publicity.

Street publicity displays are sometimes made in the German style of erecting a semi-permanent wooden structure which carries oil-painted sign-work. Some of these are spot-lighted after dusk from two sides. The principal displays of this kind are those erected for the two great annual celebrations, the May-First "Labour Day" and the November "Revolution Day." For these giant stars in neon or in red or white lamps are constructed, and enormous portrait enlargements of leaders are spot-lighted, while numbers of searchlights add to the evening brilliance. At Leningrad naval ships on the Neva are outlined with thousands of electric lamps, and many of the buildings are also fitted with neon strips.

The increasing use of large areas of glass for new buildings permits them also to add to the external

The Kropotkinskaya Gate Metro Station, showing the prominent "M" sign which is illuminated at night.

Passage between platforms in Okhotni Riad (Central Moscow) Metro Station; indirect lighting by pedestal units.

lighting. Some of the newer offices (as that of the Commissariat for Light Industries) have all-glass fronts.

**Theatrical Effects.**

In the theatres plentiful—some say extravagant—use is made of electrical illumination. In Moscow's fifty theatres, always crowded every evening of the year, lighting is everywhere at least adequate and occasionally brilliant. The immense installation on the Bolshoi Theatre stage is of German origin (there are many other theatres being built, and it is possible that not all of the equipment will be made in Russia) and it is sufficient for a small town, with eighteen or twenty rows of battens across the 30-metre stage, and very many more auxiliary lamps. Here the lighting effects are superb and as good as that found in any other theatre in the world.

Changing from this elaborate decorative use of spectacular light and colour, we may glance at the psychological usage of light in dramatic work. Some interesting effects were to be seen at the Kamerny Theatre production of "Egyptian Nights," while the "permanent set" erected for the production of "Machinal" was possible only by "changing the scene" by use of light alone. The different parts of the set are spot-lighted and sometimes lit from within, to change-over the focus of attention, the scene that is ended simply being "blacked out." The same device was used most effectively in the Children's Theatre production of "Uncle Tom's Cabin," and enabled speed of action by eliminating all waits for change of scene. All the scenery is there, but not seen until it is wanted.

Theatre buildings are larger than in London, since many contain besides a ballroom, a restaurant and several foyers, and museums which exhibit models of stage sets. Occasionally, some of these are also lighted with small lamps.

**Interior Lighting Generally.**

Lighting is similarly well advanced in the scores of cafés, hotels, workers' and children's clubs, which are filled in the period after the universal seven-hour day is ended. Traffic is not so dense as to require automatic street signals, and police on point duty serve at the few central positions where traffic is normally heavy; but street crossing are marked out in a few places by studs, and use of them is compulsory on pedestrians.

In some dwellings, lamps are often put in obsolete fittings — also in some hotels; and one may find switches that are defective on occasion (as happens in other cities just as frequently!). The standard of lighting is, as a matter of fact, much in advance of the standard of plumbing or ventilation; and installation of electric fans is in many places (i.e., in theatres, etc.) overdue, for the conditioning of air. The Metro is the best place for air-conditioning, which is effected electrically.

The hospitals and clinics are generously equipped with the most modern illumination, most often with large opal glass covers of suitable design; here again German practice has been adopted for surgical lighting, as, for example, shadeless illumination in operating theatres.

***To Our Readers Abroad—***
***Any News of Lighting***
***In Your Country?***

The Kamerny Theatre; illustrating the method of "changing the scene" by lighting up certain sections in turn, in the performance of "Machinal."

## Simple Methods of Floodlighting

We give elsewhere (p. 45) an account of the special floodlighting in Athens on the occasion of the return of King George II. of Greece. The experience of Mr. Bennett, of the Athens Piraeus Electricity Company, rather seems to bear out what was said in our last issue—that quite effective floodlighting can often be done without elaborate equipment. A few months ago Mr. L. E. Buckell, on his return from abroad, entertained members of the Illuminating Engineering Society with an account of the doings of an engineer in South Africa, who contrived useful reflectors out of petrol tins. Mr. Bennett and his company have done that very thing, and have added a new device—oil barrels sawed in two! Looking through the pleasing series of photographs of these Athens installations one finds—as Mr. Buckell did—that it is not easy to separate the installations using primitive apparatus from those using the most scientific equipment. Much so-called floodlighting is really merely ordinary lighting with the sources of light hidden from view. Effective results can be obtained by quite simple means, and it is open to any amateur to experiment.

## I.E.S. Annual Dinner

### Postponed to March 24th.

Readers will have learned that, owing to the passing away of His Majesty King George V., the Annual Dinner of the Illuminating Engineering Society, originally fixed for February 4th, has been postponed and will take place at the Trocadero Restaurant (Piccadilly, London, W.), on Tuesday, March 24th. The decision must have been a somewhat difficult one but was surely the wisest course in the circumstances.

Members of the Society should see to it that this pleasant annual event does not suffer from the postponement by rolling up on March 24th in record numbers—as we have no doubt they will.

# Literature on Lighting

## (Abstracts of Recent Articles on Illumination and Photometry in the Technical Press)

*(Continued from January, Page 17)*

### II.—PHOTOMETRY.

**26. Seasonal Variations of Daylight Illumination.**

Department of Scientific and Industrial Research, Technical Paper No. 17, H.M. Stationery Office, 1935.

The paper summarises the results of measurements of skylight made at the National Physical Laboratory over a period of ten years. Work now in progress with a photo-electric electric recorder will make possible more detailed results. At present records have been taken at Teddington only, but comparative studies in other localities are now being initiated. J. S. D.

**27. Two Photo-voltaic cell Photometers for Measurement of Light Distribution.**

*C. L. Dows* and *G. R. Baumgartner.* Am. Illum. Eng. Soc., Trans., XXX., pp. 476-486, June, 1935.

In the two photometers described a number of photo-voltaic cells are used, in the one case for the determination of reflection factor at various angles (and integrating when required), and in the other for the determination of the total luminous output of a fitting with a symmetrical distribution. G. H. W.

**28. Evaluation of Ultra-violet Radiation.**

A Special Report of the Committee on Nomenclature and Standards. Am. Illum. Eng. Soc., Trans., XXX., pp. 568-570, July, 1935.

The committee recommends that for the purposes of illuminating engineering ultra-violet radiation be evaluated on the basis of erythemal effectiveness as represented by the factors compiled by W. W. Coblentz in Research paper No. 631, Bureau of Standards Journal of Research, Vol. 12, pp. 13-14, January, 1934. A number of definitions are proposed. The original report should be consulted. G. H. W.

**29. Light and ultra-violet Reflection by various materials.**

*A. H. Taylor.* Am. Illum. Eng. Soc., Trans., XXX., pp. 563-567, July, 1935.

This paper presents reflection factors of various materials commonly used as reflecting surfaces, as well as for a number of paints of varying characteristics; both for visible light and for ultra-violet radiation of 2967A, which is approximately the wave-length of greatest effectiveness in the production of erythema or sunburn. G. H. W.

**30. Measurement of small light-intensities with the electron-counter.**

*K. H. Kreuchen.* Zeits f. Physik, 97, pp. 625-632, 1935.

It has been shown that the electronic efficiency of electron-counters is the same as that for photo-cells of the same metal. The presence of mercury vapour lowers the efficiency considerably. For cadmium and zinc cells it is shown that treatment with activated hydrogen does not change the sensitivity from that possessed by the gassed-out metals. It is found possible to produce photo-electron-counters with a reproducible sensitivity which is the same as that in photo-cells with thick-layer gassed-out electrodes of the same metal. Such photo-electron counters have the advantage over the photo-cell that they react to every individual released electron. Whether any further increase of efficiency can be obtained, perhaps by a chemical activation, remains to be seen. T. H. H.

**31. A New Electron Multiplier and a New Electric Eye.**

*V. K. Zworykin, D. A. Morton,* and *L. Malter.* Nature, 137, January 4 and January 11, 1936, pp. 36 and 60.

A new photo-cell has been made in which primary photo-electrons are made to impinge on a target having a high secondary electron emission characteristic. This process is repeated several times, an amplification obtained of about a million. By suitably focusing the the final electrons on to a fluorescent screen as an artificial retina, a picture may be formed of the view "seen" by the photo-cell. The range of sensitivity extends from 180 $\mu$ in the ultra-violet to 1,300 $\mu$ in the infra-red. T. H. H.

**32. Transparency of Sea Water.**

*H. Pettersson.* Nature, 137, January 11, 1936, p. 68.

A new instrument for measuring the transparency of sea water at depths of 500 metres is described. A horizontal beam of electric torch light passes through the glass window of a sealed chamber to a mirror at a distance of one metre and is reflected back to a selenium phota-e. m. f. cell in the original chamber. A four-lead rubber insulated cable suffices to connect the lamp to accumulators on board ship and the cell to a micro-ammeter. The same instrument used without the mirror can be used as a light-scattering meter. Interesting results were obtained. T. H. H.

### III.—SOURCES OF LIGHT.

**33. Influence of Filament Form on Beam Characteristics with Deep Paraboloids.**

*G. Mili.* Am. Illum. Eng. Soc., Trans., XXX., pp. 611-620, September, 1935.

The data presented show the influence of filament form on beam characteristics, and will apply to all combinations of lamps and reflectors which are related in the same proportions as the elements investigated. The possibilities which might be realised and the inherent limitations which must be considered in the design of projectors using deep paraboloids and tungsten light sources are indicated. G. H. W.

**34. Fundamental Industrial Research.**

*I. Langmuir.* Gen. El. Rev., 38, pp. 324-333, July, 1935.

In the course of an historical record of his work, Langmuir describes the development of the drawn tungsten filament, improvements in early lamps, and, finally, the fundamental work leading to the gas-filled lamp. G. H. W.

**35. The I.E.S. Certified Lamp Programme.**

*W. F. Little* and *R. B. Brown, Jun.* Am. Illum. Eng. Soc., Trans., XXX., pp. 593-601, September, 1935.

The paper describes the origin of the study lamp and reviews its technical qualities. The commercial aspects of the lamp and the position of the I.E.S. in that connection are described. G. H. W.

**36. High-power Hydrogen Tube.**

*St. Vencov.* Revue d'Optique, Vol. 14, No. 10, p. 372, October, 1935.

Describes a water-cooled hydrogen lamp for giving a high intensity in the region from 2,100 to 2,300 Å. The operating voltage is 4,000, from a 220 V. transformer. R. G. H.

**37. A Self-protecting Cathode.**

*E. F. Lowry.* Electronics, 8, pp. 520-522. December, 1935.

The author describes a particular construction of the cathode for units such as hot-cathode ultra-violet lamps, where it is essential that a heating period for the cathode be allowed before thermionic emission occurs. S. S. B.

**38. Electric Discharges in Vacuum and in Gases at Low Pressure.**

*I. Langmuir.* Gen. El. Rev., 38, pp. 452-457, October, 1935; pp. 514-519, November, 1935.

Comprehensive papers dealing with early experience, modern theory, and the nature of the phenomena obtained. G. H. W.

**39. Electric Discharge Lamps.**

*W. Rule.* Elect., 115, p. 765, December 20, 1935.

A summary is given of a lecture by the author on the use of discharge lamps for industrial purposes. The limitations due to stroboscopic effect and colour rendering are discussed. Spacing and height recommendations are made. C. A. M.

**40. Progress in Outdoor Lighting with Sodium Vapour Lamps.**

*G. A. Eddy.* Gen. El. Rev., 38, pp. 458-463, October, 1935.

A street lighting unit for a 10,000 lumen sodium vapour is described, and performance data are given. Illustrations of highways lighted with the lamps are shown. Other applications of the lamp are mentioned. G. H. W.

**41. The "Third Eye."**

*V. K. Zworykin* and *G. A. Morton.* Elect., 116, p. 30, January 10, 1936.

A brief description is given of the potentialities of a new electron tube, developed in America by the authors, which on its fluorescent screen is said to render visible both infra-red and ultra-violet radiation. The range is from 1,800 Å to 13,000 Å. C. A. M.

## IV.—LIGHTING EQUIPMENT.

**42. Control of Electric Lamps for Public Highways Lighting.**

*E. de Nantes.* R.G.E., Vol. 38, No. 23, pp. 779-781, December 7, 1935.

A study of relays for the control of lamps. W. R. S.

**43. Light-sensitive Cell Circuits.**

*Samuel Wein.* Electronics, 8, pp. 530-532, December, 1935.

The author describes several circuits which have been introduced for using the selenium and cuprous oxide types of cell, from the direct simple circuit to three-stage amplification. S. S. B.

**44. Application of Photo-Electric Controllers.**

*E. H. Vedder.* Electric Journal, Vol. 32, No. 10, p. 425, October, 1935.

The optical systems used in photo-electric control gear are described with explanatory diagrams, and some practical details of such control work are given. R. G. H.

**45. Studying Parts in Motion.**

*R. C. Hitchcock.* Electric Journal, Vol. 32, No. 12, p. 529, December, 1935.

Describes the use of a special design of cold cathode discharge lamp in conjunction with a contactor, for the photographic or visual examination of parts in motion. R. G. H.

**46. Ultra Speed in Motion Pictures.**

*Anon.* Electronics, 8, pp. 500-504, December, 1935.

A detailed description is given of a high-speed camera designed to take pictures at speeds up to 3,000 per second. S. S. B.

**47. New Equipment.**

*Anon.* Elect., 115, p. 779, December 20, 1935; Elect., 116, p. 20, January 3, 1936.

Photographs, with brief descriptions, are given of types of study lamps now available. C. A. M.

**48. The Ultra-Violet Test as an Aid in the Glass Industry.**

*J. Grant.* Glass, p. 520, December, 1935.

When various types of glasses are examined in filtered ultra-violet light, differences can be noticed which are primarily dependent on the composition of the glass; thus certain constituents may be identified without analysis. The so-called "natural" fluorescence of glass appears to depend on the physical state of the glass as well as on the composition; it may be considerably modified by the presence of extremely finely divided solid matter. S. E.

## V.—APPLICATIONS OF LIGHT.

**49. A Survey of Lighting Education in the United States.**

*I.E.S. Committee on Lighting Education*, Am. Illum. Eng. Soc., Trans., XXX., pp. 621-636, September, 1935.

A summary of a nation-wide survey. Reference is made to courses in lighting offered by various educational institutions. G. H. W.

**50. Light and Architecture.**

Am. Illum. Eng. Soc., Trans., XXX., pp. 585-591, September, 1935; pp. 661-670, November, 1935.

Illustrated descriptions of fifteen modern lighting installations. G. H. W.

**51. Quality of Lighting.**

*M. Luckiesh and F. K. Moss.* Am. Illum. Eng. Soc., Trans., XXX., pp. 531-561, July, 1935.

The paper describes the change in approach which has been made in investigating the quality of lighting required for visual tasks. Psycho-physiological phenomena are discussed in detail and also the characteristic effects of lighting in the central and peripheral visual fields. Finally, the effects of visible light sources are described. G. H. W.

**51. Underground Stations.**

*Anon.* Elect., 116, p. 32, January 10, 1936.

A brief description, with a photograph, is given of a test installation of gaseous discharge tubes for lighting on the Paris Underground. In each case a red tube (neon) and a green tube (argon, mercury, and fluorescent coating) are housed in a ground-glass outer tube which serves to diffuse the light. C. A. M.

**52. The Glare Problem.**

*D. G. Sandeman.* El. Rev., Vol. 117, No. 3033, p. 52, January 10, 1936.

It is suggested that constant glare be produced by a suitable form of polar curve of the fittings of a street-lighting installation. On this basis the advantage of high focusing (85°) is confirmed. R. G. H.

**53. Glare from a Sodium Light.**

*M. Luckiesh and F. K. Moss.* Am. Illum. Eng. Soc., Trans., XXX., pp. 602-608, September, 1935.

Data are presented which indicate that, under certain conditions, glare from sodium-vapour light produces greater reductions in threshold visibility than glare from tungsten-filament light of equal brightness. This differential effect becomes less pronounced as the angle between the glare source and line of visibility increases. It is negligible for angles of greater than 5° (authors). G. H. W.

**54. A Review of Flood-lighting.**

Gas World, December 28, 1935.

Contains an interesting review of flood-lighting by gas for 1935. J. G. C.

**55. Flood-lighting of a Church.**

Gas Times, January 4, 1936.

Contains an illustrated description of the flood-lighting by gas lamps of Lambourn Parish Church. J. G. C.

**56. Illumination for Indoor Cricket School.**

Gas World, December 28, 1935.

Contains an illustrated description of an indoor cricket school, illuminated by means of gas. J. G. C.

**57. Lighting South African Flats.**

*Anon.* El. Times, 88, pp. 809, December 26, 1935.

A series of photographs, with a brief description of modern lighting in South African flats. W. R. S.

# Recent Patents

*(Abstracts of recent Patents on Illumination & Photometry.)*

**No. 437,001. "Improvements in Lamps with Lenses and Reflectors."**

*Dietrich, F. R., January* 25, 1934, *February* 5, 1934, *April* 25, 1934, *June* 14, 1934, *December*, 17, 1934 (*Cognate Applications; Convention, Germany*).

This specification covers a projecting lamp, such as a head lamp, having a reflector in the form of approximately one-half of an ellipsoid and a lens-system fitting the open end of the reflector and consisting of two or more dispersing lenses of different dispersive powers. The lens system may consist of a single piece of glass ground in concentric zones of different curvature. One zone may be prismatic or one or both zones may be cylindrical. Various forms of light distribution may thus be obtained.

**No. 437,045. "Improvements in Miners' Safety Lamps."**

*Hailwood, E. A. May* 9, 1934.

This specification describes a box-like baffled cowl or top vent for a miner's lamp, comprising a series of vertical baffle walls disposed around the lamp outlet between two horizontal plates to provide a labyrinth through which the products of combustion may pass, being cooled thereby. Direct through-ways are provided between the outermost baffles and those immediately within to provide clear passages for external draughts and to prevent the latter from blowing the products of combustion back into the lamp.

**No. 437,323. "Improvements in Electric Cathode Glow Discharge Lamps."**

*The General Electric Company, Limited* (*Communicated from Germany*), *October* 17, 1934.

According to this case luminescent material is placed upon the cathode of a discharge lamp where its maximum brilliancy may be secured, and the short life, which would normally result from this disposition, is increased by reducing the cathode potential drop and consequent energy of ions striking the cathode, by also coating the cathode with a substance such as alkali earth metal or compound.

**No. 437,369. "Improvements in or Connected with Electric Signs."**

*Strand and Interchangeable Signs, Limited, and Andrews, F. A., April* 23, 1934.

This specification discloses a luminous sign, comprising a series of solid glass rods arranged vertically, contiguous and in one plane in front of a number of vertical light sources at such distances that the rods are evenly illuminated, and a series of detachable wood or metal letter signs with spring clips to engage the glass rods or to engage other glass or metal rods disposed horizontally and in front.

**No. 437,988. "Improvements in or Relating to Light Polarising Devices."**

*Reveley, P. V., and Baird Television, Limited. August* 28, 1934.

In order to provide a polarising prism in which both the aperture and the angle of the emergent cone of light are large while avoiding the use of excessively large pieces of Iceland spar, a polarising prism of the kind in which the unwanted ray is totally absorbed, comprises a mass of doubly refracting material having a plurality of ray-separating interfaces. The optical axes of the several pieces of material are preferably parallel and the interfaces may be provided by air layers. The planes of the interfaces preferably intersect. In a particular case the prism comprises four triangular-sectioned pieces of material assembled to form a rectangular block with air spaces between them.

**No. 438,118. "Improvements Relating to the Mounting of Lamps for Street Lighting."**

*Hardy and Padmore, Limited, Southall, T. J., and Guise, C. May* 1, 1934, *September* 7, 1934. (*Cognate Applications.*)

According to this case the lantern of a street lamp is suspended from a carriage which is slidable along an arm protruding horizontally from a supporting column. Wheels of the carriage may roll upon auxiliary rails supported by the horizontal arm. Means may be provided for securing the lantern in either of its extreme positions. A hinged manual control rod may be connected to the carriage and a hook or the like may be provided upon the supporting column to receive the end of this rod.

**No. 438,168. "Improvements in or Relating to Vehicle Lamps."**

*H. Clarke and Co.* (*Manchester*), *Limited, Rowlinson, R., and Mottershead, F., December* 21, 1934.

This specification relates particularly to cycle lamps and covers a lamp assembly adapted to project differently coloured light in opposite directions mounted upon one end of an arm of which the other end has a pivotal connection to the vehicle enabling the lamp and arm to be swivelled in two positions, one fore and aft and the other lateral, the assembly being locked to the pivot in both of these positions and a switch controlling the lamp being closed in one of them. Thus, in the fore and aft position the lamp is switched off and in the lateral position the lamp is switched on, projects sideways from the vehicle and casts light forwards and backwards.

In another specification, No. 438,169, of the same Company and Carlisle V., and of the same date, there is described a similar lamp in which the arm comprises a tubular casing to hold a battery, while in a specification, No. 438,133, of the same Company, and Rowlinson R., dated May 12, 1934, there is described a manner of attachment of the reflector or glass of such a lamp by means of a deformable intermediate bush or gasket.

**No. 438,417. "Improvements in and Relating to Gas Discharge Lamps."**

*The British Thomson-Houston Company, Limited, July* 28, 1934. (*Convention, U.S.A.*)

This specification describes a gas discharge lamp mounting comprising a lamp holder embraced by an internally shouldered mouth, preferably internally screwed, for receiving a globe, a heat-insulating gasket against the shoulder and a double-walled heat-insulating, preferably evacuated globe, engaging the mouth and gasket and enclosing the lamp bulb. The lamp bulb preferably has a reduced neck and a thermally insulating gasket or washer fits around the neck of the lamp and against the globe wall.

# Artificial Lighting in The Duveen Extension of The National Portrait Gallery

We are indebted to Mr. R. R. Holmes for the following description of the new lighting at the National Portrait Gallery. A fuller illustrated account has been contributed by the Director, Mr. H. M. Hake, to *The Museums Journal* (Jan., 1936).

IT will be recalled that members of the Society, at the kind invitation of the director, Mr. H. M. Hake, inspected on Tuesday, October 22, the new lighting in the Duveen Extension of the National Portrait Gallery.

The Director then explained how the problem of providing artificial illumination had arisen after the completion of the building, and how the aim of such lighting was "to provide a series of rooms pleasant to walk into, in which the pictures could be seen with a fair minimum of disturbance from reflections." To this end, he said, designs had been worked out by the lighting consultant, Mr. R. R. Holmes, in close conjunction with Mr. Pledge, of the Architectural Division of H.M. Office of Works; while the construction of models and the erection of fittings had been largely in the hands of Mr. Fitz-Gibbon, of the Engineering Division of the same office.

On the second floor the galleries are lit, during the day, from a straightforward lantern (skylight) with a cove below (see Fig. 1). Following numerous experiments, it was decided to employ two main fittings secured to the arches spanning the room. The fittings themselves can be seen in position: the half-conical fitting mounted above the main circular fitting serves to maintain the illumination in the corners of the room.

[*By courtesy of H.M. Office of Works*

Fig. 2. First Floor, Octagonal Room: (Daylight photograph).

Note the false beam which has been built on to the ceiling to conceal the lighting fittings.

On the first floor daylight is admitted to the rooms through side windows reaching up to the ceiling level. The shape of the room at the end of the corridor was that of a regular octagon, and in order to minimise reflections of the ceiling in the pictures, an artificial beam (see Plate 2), behind which the fittings were concealed, was built down from the ceiling.

[*By courtesy of H.M. Office of Works*

Fig. 1. Second Floor Fittings: (Daylight photograph).

Note.—The fittings have undergone slight modification since the above photograph was obtained.

[*By courtesy of H.M. Office of Works*

Fig. 3. First Floor, Small Room Fittings: (Daylight photograph).

The small rooms leading out of the corridor are each in the shape of an octagon described about an ellipse, and, owing to the peculiar angles between the walls, it was found necessary to employ two fittings in each room in order to avoid troublesome reflections. The fittings (see Fig. 3) are shaped to suit the room, and the opal glass cases contain focusing floods for lighting the walls and separate lamps for general illumination.

Throughout the work it had to be borne in mind that the artificial lighting would be in use for only a small proportion of the total time that the gallery is open to the public, and every effort was made to avoid spoiling the lines of the existing architecture with the fittings or their accessories. It was for this reason, indeed, that the fittings had been secured direct to the structure and designed as far as possible to appear as part of it.

There is no space here to go into details of the fittings or the difficulties encountered in the course of the design, but the following particulars may be of interest:—

| Floor. | Room Size. | Height to Top of Pictures. | Fittings. | Watts. |
|---|---|---|---|---|
| 2nd | 50′ × 30′ × 34′ high | 13′ | 2 Main (1,500 W.)<br>2 Auxiliary (300 W.) | 3,600 |
| | 30′ × 16′ × 23′ high (three rooms) | 9′—13′ | 2 Main (500 W.)<br>2 Auxiliary (260 W.) | 4,560 |
| 1st | Octagon : 31′ across × 18′ high | 9′—13′ | 18 Troughs (100 W.) | 1,800 |
| | Oblong : 22′ × 17′ × 17′ high (three rooms) | 9′ | 2 Fittings (420 W.) | 2,520 |

# Electric Discharge Lamps in Industry

Some interesting applications of high-pressure mercury electric discharge lamps in industry were recently described by Mr. R. O. Ackerley in the G.E.C. Journal. We are indebted to the General Electric Co., Ltd., for the illustrations accompanying this note. They are selected chiefly to illustrate how the diffused character of the light yielded by these lamps has proved advantageous for certain industries

An example of the use of Osira lamps in a foundry. Here the high pressure mercury lamps seem to have a special field of utility. One main reason for this is doubtless the fact that the light comes from a column of luminous gas instead of a filament so that the shadows are softer. The light is thus better able to "get round corners," and to penetrate into recesses.

This quality of diffusion is well illustrated in the adjacent photograph of a man working at a mould in a foundry. It is found that the light penetrates readily into even the deepest sand moulds. It is also stated that the colour of the light is favourable to ease of vision—a belief that has been explained, in the case of close inspection of objects, by the fact that "chromatic aberration" of the eye is diminished.

where the colour of the light is not considered a drawback, but, in certain cases, a positive advantage.

The relatively soft character of the light from electric discharge lamps is an advantage in that less effort is necessary to counteract glare, and attention may be concentrated on distribution. Here we have a marked departure from the electric incandescent lamp which is favourable to wider spacing and has the effect of accentuating the illumination in a vertical plane (one advantage, doubtless,) in railway sidings). For a few industries, such as those concerned with accurate colour matching, the lamps are naturally unsuitable. But in many other cases the colour is not regarded as a drawback, and in certain instances —illustrated here—it seems to be actually beneficial in increasing the ease with which visual tasks can be done. One effect that certainly does require consideration is the effect of the light (which oscillates in synchronism with the a.c. supply) on moving objects. Experience seems to show, however, that marked effects only arise in the case of the faster machinery, and that even this may be practically eliminated by wiring adjacent fittings on separate phases of the electrical supply.

The Inspection of Flaws in Plate Glass. These, too, are stated to be easily detected under high pressure mercury vapour light.

The adjacent picture shows the use of Osira lamps for railway work. This is another field for which mercury electric discharge lamps are believed to be specially suitable. Here again the diffusion of light is an advantage, and the natural distribution of light is also favourable to the lighting of large open spaces.

Here we have an instance of a special application—in coal and ore picking. It is found that the light of the mercury lamps somehow enables the refuse to be picked out with special ease. The explanation seems to be that the difference in colour of material and refuse—possibly small by white light—is accentuated. This could easily be understood if the refuse had a slightly reddish tinge—as is the case with much of the rust and scale found in iron works.

The new **Main Entrance Hall** of **Odhams Press Ltd.**, which has been lighted in a very effective manner by indirect methods. There is cornice lighting on three sides and three laylights (one of which is visible in the picture above) designed on the G.V.D. system. Only 22 lamps were used in this installation. The hall is 27 feet high. The effect of the curved laylights let into the ceiling, combined with the cornice lighting, is highly decorative—the "monotony" which is sometimes a feature of this mode of lighting being skilfully avoided. The Architects were Messrs. Yates, Cook & Darbyshire.

# Reviews of Books

*The Practical Electrician's Pocket Book.* (*Odhams Press, Limited, London*, 1936, *pp.* 598 + *xlii.*)

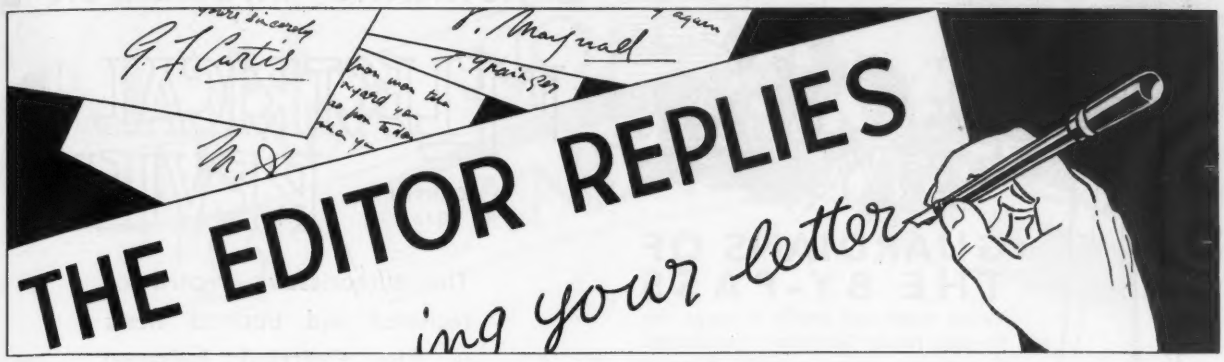
The 38th edition of this compact little publication is to hand. It contains approximately 600 pages and remains as ever a miracle of condensation at its very moderate price (2s. 10d., post free). The sections cover a very wide range. Developments in research and applications of electricity during the past year are reviewed in an introductory contribution by Mr. A. P. M. Fleming. Many chapters have been revised. The voltage tables have been considerably extended so as to occupy nearly 80 pages and cover 7,000 districts in Great Britain. The section on Photometry and Lighting occupies 20 pages, and in some respects has been brought up to date. We are, however, still of opinion that, considering the limitations of space, the tabular data relating to spacing and mounting height coefficients of utilisation, etc., might be diminished with advantage.

*Enseignes Lumineuses Electriques, A. Vallat and R. Beyaert.* (*Dunod-Editeur, Paris*, 1936, *pp.* 274, *figs.* 200.)

Books dealing with luminous signs are not too common, and a treatise on practice in France is therefore welcome. The book is divided into two main sections, preceded by a short introduction dealing with light and its effect on the eye. Subsequently Section I. deals with signs using incandescent lamps, and Section II. with signs based on the use of luminous tubes. The section dealing with incandescent lamps is sub-divided, chapters being devoted to signs using visible lamps, transparencies, and devices based on the use of reflected (indirect) light. The construction, characteristics, and methods of mounting cold cathode tubes are discussed in some detail. A final chapter is devoted to certain special types, such as phosphorescent and polychromatic tubes and their use in practice.

*Gas Meters. by A. T. Gilbert.* (*Technical Press, Limited, London*, 1936, *pp.* 256, *figs.* 92.)

The third edition of this handbook, intended for engineers and managers, inspectors, fitters, and students, carries a foreword by Mr. S. B. Chandler. The author's introduction deals mainly with the historical side, summarising efforts to design meters from the days of Samuel Clegg onwards. The series of thirteen chapters deals with wet and dry meters, methods of fixing, inspection, prepayment mechanisms, etc., with a special section on high output meters. An Appendix contains "Facts to Remember," questions for students, and various useful data. The book is lucidly written, well illustrated, and carries an adequate index.




***Anything you'd like to say?***
***Anything you want to know?***
***Come, let's have it right away:***
***Time is passing here below!***
***Come let's try to figure out***
***Things we feel concerned about.***

A welcome letter from Lieut-Commander Haydn T. Harrison comments on the note entitled, "**Public Lamp Standards 30 in. High,**" in our last issue (p. 3). Let it be confessed—that note was not without guile. We rather hoped that it would catch the eye of Lieut.-Commander Harrison—whose work in this field we well remember—and we are delighted to see that though in retirement he still "scents the battle from afar."

He recalls his paper for the Commission Internationale de l'Eclairage (1924), and before the I.E.S. (1933), describing a substantially similar method, which was provisionally patented and tested out on a road in Kent. The visibility was good, even though the consumption was only 100 watts for 300 yards of roadway, but the appearance of the roadway was irregular, and the method did not seem likely to become popular.

Mr. Howard Long has taken us to task for saying, in the last issue, that "**the Inverse Square Law is always true.**" A copy of "The Reflector" contains an excellent contribution by him on this topic, which commences with the statement that "this law very rarely applies in practice." He says, truly enough, that our comment did not tell the whole story, which we will presently try to rectify by an explanatory article. (In short, Mr. Long, we both mean the same thing, really.)

Mr. A. W. Beuttell sends us an intriguing paper by Dr. Miles A. Tinker (of the Department of Psychology, University of Minnesota), who deals some shrewd blows at Dr. Luckiesh and his fellow advocates of **super-illuminations.** He points out the importance of adaptation of the eye and its bearing on tests to determine "what illumination readers prefer," and takes exception to estimates of desirable illuminations running into hundreds of foot-candles. It is refreshing to find someone breaking a lance on the other side for once in a way, and really Dr. Tinker's view of what is requisite—10-15 foot-candles for all but abnormal eyes and illegible print, and less where distribution of light is poor—goes a long way beyond the standards of a few years ago. Of special interest is his belief that with poor distribution, lower values of the order of 3-5 foot-candles answer best.

We have had several inquiries about the **Study Lamp,** illustrated in our last issue (p. 22). We understand that a detailed specification is being prepared, but in the meantime we are informed that the illumination, within two feet from the base of the lamp, should not be less than ten foot-candles: also that the lamp will presumably be available from all the leading makers of lighting fittings.

Our statement last month that "**electric discharge lamps will only start when cold,**" requires qualification. We were, of course, thinking of h.p. mercury lamps. Mr. R. P. Sayers, of Philips Lamps, Ltd., points out that sodium lamps will start equally well when hot. If lamps have been switched off long enough to get cold, they must, of course, go through the warming up cycle again—but **they always strike,** hot or cold.

We have been asked to mention several **books on neon.** Specific information on candle-power and brightness of various forms of tube-signs is not very easy to obtain. We might, however, mention two books that have been reviewed in this journal, "Neon," by S. Gold (Crosby, Lockwood and Son, 1934), and "Neon Tube Practice," by W. L. Syhallreuter (Blandford Press, 1933); also a more recent book, "Neon Signs," by S. C. Miller and D. G. Fink (McGraw Hill, 1935).

Of interest in this connection is an inquiry received for a convenient method of **measuring the light from mercury vapour lamps.** There is no royal road here, but we have referred our correspondent to the "Auto-Photometer," frequently advertised in our columns, in which a simple correction for the colour of light from the illuminants studied is embodied.

A subscriber asks us on the telephone where to get "Restalite" fittings. To quote the familiar hymn, "We do not know, we cannot tell, nor can the memory find." Perhaps some reader can oblige. We could only suggest that he might mean the familiar modified artificial daylight units furnished by Restlight, Ltd.

We have had inquiries about the application of **infra-red rays** for the control of pedestrian crossings. Apparently experiments are being made on the St. Helier Estate, but we have so far been unable to get details. The idea of causing the blocking of an invisible ray by a person's body to operate a signal by means of a photo-electric cell is, of course, familiar—it is used in the Radiovisor Counting unit. But the application of the idea to passenger crossings is new.

A somewhat allied problem, often put before us, is the use of a method of detecting infra-red radiation—which can penetrate fog and mist with ease—on motor-cars. Such **an "electric eye"** could detect headlights of distant cars when the visible rays are completely obscured. It would also prove valuable to ships and aircraft during foggy conditions. The problem is to find a fluorescent screen on which a sufficiently luminous image of sources, emitting infra-red as well as visible rays, could be produced. It is stated that a device of this kind was recently exhibited at St. Louis—but this is not the first claim of the kind.

Someone has just dropped in to ask why other railway stations do not follow the example of Waterloo and install a **boldly legible illuminated indicator,** on which the times and destinations and platforms of trains can be seen from a distance—why at Charing Cross the space that might be so used is allotted to a popular brand of whisky—and why at Liverpool Street intending passengers, occupying a commanding position on the bridge, feel that they are peering down into chaos? We cannot say.

## Floodlighted Crossings and "Belisha Beacons"

To light or not to light?

This has been the problem with the Belisha beacons, which are admittedly inconspicuous objects at night time, when, in many cases, they are most urgently needed. On inquiry at a recent exhibition devoted to transport, we were told by exhibitors that translucent orange globes arranged to house lamps inside were even now being supplied to certain local authorities. Most of them, however, were discouraged by early experience of a stone-throwing section of the public. They quickly abandoned the idea of illuminated glass globes and fell back on the less destructible metallic variety. These, of course, are now in very general use—though it may be noted that the use of these "beacons" is not compulsory, and in many areas nothing of the kind is adopted.

It is probable, however, that experience with illuminated beacons would to-day be more successful. The original animosity towards them seems to have died a natural death. Glass globes might now be treated with more consideration. But, in any case, it should not be difficult to contrive a method of lighting up the amber spheres externally—and possibly illuminating the crossing at the same time by diverting a portion of the light to this purpose. Experiments with something of the kind are now being made in Ealing. Apparently, however, it is desired to secure a contribution to the cost from the Ministry of Transport: and according to the "Evening Standard" this is only to be expected "in exceptional circumstances."

# TRADE NOTES AND NEWS

## Illuminated Bell Push Assembly

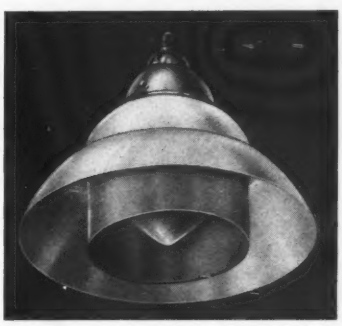

The idea embodied in the adjacent "Efesca" Bell Accessory, which is listed by Messrs. Falk Stadelman and Co., Ltd., is worth noting by illuminating engineers. The idea that the name of a house should be illuminated at night is familiar. This illuminated bell-push gadget allows the word "Night" to appear luminous when the lamp is switched on, and the overlapping plate glass front also receives some of the light so that "Day" is also visible but with reversed contrast. Inside the box is fitted a lampholder arranged to take a 6-volt festoon automobile lamp (16 × 44 mm.). The idea may be strongly commended to the medical man whose "night" bell is only too frequently in use.

## An Indirect Wall Bracket

The use of occasional brackets on stairways, etc., is becoming quite usual. The "Pinup" indirect unit which is furnished by Electrical Agencies, Ltd., and is here illustrated is a pleasing example of this type of unit. It uses a 250-watt lamp and can, it is stated, be "hung up or taken down as easily as a picture," although its appearance is quite permanent. It gives a soft and restful light free from glare, without the strong wall shadows that sometimes form a drawback to bracket lights.

## A Compact Lighting Unit

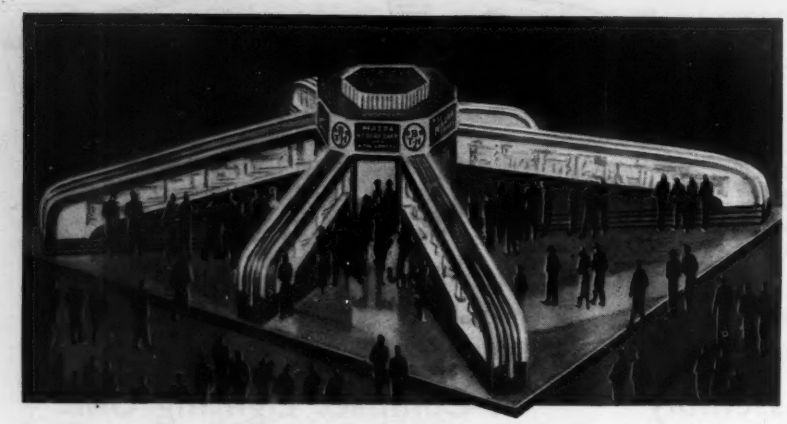
A lighting unit of unusual design, illustrated below, has recently been introduced by L. G. Hawkins and Co., Ltd. The "Wundalite" may be used either with chain suspension or mounted direct on the ceiling as shown. The component parts are simple. The frosted glass cone fits into an opal reflector, and the combination gives a very soft and well-diffused light. The parts are very easily assembled and readily accessible for cleaning. A specially designed metal gallery which conforms to the pleasing outlines of the unit is provided.



The "Wundalite," a novel pendant unit introduced by L. G. Hawkins & Co., Ltd.

## Revo Exhibit at the B.I.F.

We understand that an important feature of the exhibit of Revo Electric, Ltd., at the British Industries Fair will be the display of modern street lighting equipment, especially units of the Magnalite type which have been in great demand.



An Impression of the Mazda Stand at the British Industries Fair, Castle Bromwich

## B.T.-H. at B.I.F.

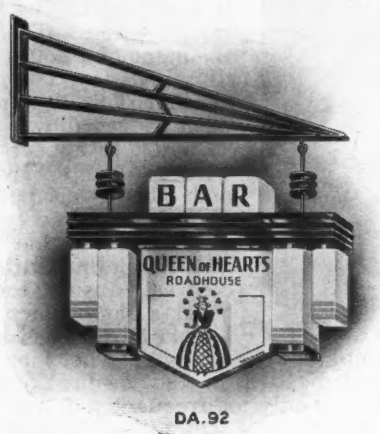
When viewed from above the B.T.-H. stand will resemble a huge star, the central portion of which forms a charming lounge and office; six walls of display windows radiate from the centre lounge and gradually slope down to the edges of the stand. The symmetrical form of the stand is clearly defined by the effective outlining with Mazda light tubes of various colours. In the display windows there will be a representative arrangement of all the B.T.-H. Company's products in the lighting field.

## Holophane "Auralite" Fittings

A range of semi-indirect fittings of striking design, the "Auralite," has recently been introduced by Holophane, Ltd., and is illustrated below. Our picture shows a pendant type with rod suspension, but the effect of the semi-indirect bowl, which is available in two sizes, is possibly even better. The main portion of the lighting unit is enclosed by a two-piece bowl, the bottom of which has reflecting prisms for directing the light upwards; the upper dome carries a series of refracting prisms for throwing the light over a wide area. The top and bottom portions are clamped tightly together so that the internal prisms are sealed from any dust or dirt. The "all-smooth" exterior is an aid to easy maintenance, and we understand that this new type of unit has met with a very favourable reception.

THE HOLOPHANE "AURALITE"
A New Prismatic Pendant Unit of Modern Design

## Hailware Outdoor Signs

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Here is one of several new designs in outdoor signs introduced by Hailwood and Ackroyd, Ltd. It illustrates the effective use of glass panels, cubes, and cylinders, and modern decorative metal work for signs intended for cafés, road houses, etc.

## The New Daylight Inn, Petts Wood

This striking floodlighting installation of the new Daylight Inn, Petts Wood, which owes its name to Willett, the originator of Daylight Saving, was obtained with eight Siemens 400-watt primrose colour Sieray electric discharge lamps in special lanterns. Even though only ten feet from building to lamps was available, the light reaches up to the roof and chimney stack. The architect was Mr. S. C. Clark, and the installation was carried out by S. Rogers and Co. (London).

# A Floodlighting Toy

The "Jubilee" floodlighting which so impressed the public with the arts of the illuminating engineer has also proved an inspiration for the toymaker, with the result that a miniature floodlighting set is now being sold by a London store "for illuminating forts, dolls' houses, stations, etc." The floodlighting set is described as comprising three lamp units, switch, flex, staples, battery clips, screws and washers, screwdriver, extra bulbs, colour discs, and battery. "See your toys floodlit in brilliant coloured light" is the injunction to the up-to-date child. The cost: a mere five shillings!

# Flashes

British exports of gas-filled lamps of 20 volts and over were valued at £332,000 in 1934, an increase of £78,000 over the previous year. Australia and South Africa are the biggest individual purchasers, and between them accounted for no less than £49,000 of the increase. Exports of lamps other than gas-filled, at £135,000, showed a decrease of £8,000 in 1933.

* * *

The Dutch East Indies have placed restrictions on the importation of foreign lamps, with a view to encouraging imports from Holland.

* * *

During the first eleven months of 1935 Irish Free State imports of electric lamps totalled £65,475, an increase of £8,427 over the corresponding period of 1934.

* * *

Electric floodlights imported into New Zealand now pay 10 per cent. ad valorem under the British preferential and 35 per cent under the general tariff.

* * *

New lighting installations carried out and in prospect in Manchester include the Central Library and the Town Hall extension.

* * *

The illumination of Blackpool Tower as an aircraft beacon is under consideration.

* * *

Manchester has recently installed electric discharge lamps in several main and secondary roads (e.g., the Manchester-Ashton-under-Lyne, Stockport-Gatley-Altrincham, etc.). New lighting has also been installed on the Marple Bridge-Mellor roads in Derbyshire—an area which has been notorious for the fact that only beacon lighting has hitherto been used on certain bus routes.

## The New Central Fire Station, Birmingham

Lighted by Holophane Hedralite Fittings, mounted on the ceiling. Each main lighting unit contains three 100-watt lamps, each equipped with a special Holophane prismatic reflector for increased efficiency. Holophane Widerlite Bulkheads are used in the drill tower. The installation was carried out by Messrs. Walker Bros., of Birmingham.

Ferndale, California, has a living Christmas tree 118 ft. high with a 50 ft. spread, which is illuminated electrically at Christmas. More than 500 lamps are used, and the tree, when lit up, is visible for miles.

* * *

Camberwell Borough Council is installing electric discharge lamps in some 140 miles of roadway. Over 4,400 mercury vapour lamps will be used.

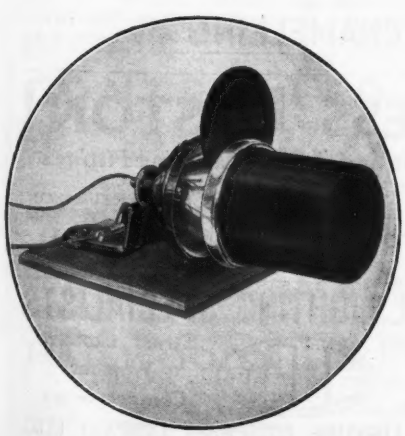
* * *

Thirty-three "Highway" fittings containing electric discharge lamps have been furnished by Engineering and Lighting Equipment, Ltd., to the order of the North Metropolitan Electric Power Company for the lighting of Silver-street, the eastern outlet of the North Circular-road, which carries a very heavy volume of traffic.

* * *

The British Thomson-Houston Company, Ltd., have received from the Booth Steamship Company, Ltd., and from the Great Northern Railway Company (Ireland) contracts for the supply of Mazda lamps for twelve months ending December, 1936.

# Controlling By Light

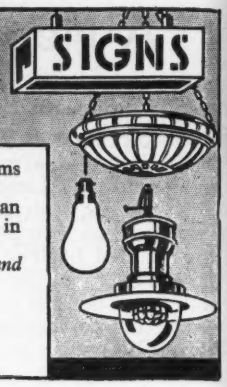


The Raycraft Projector.

The possibilities of automatic control by light are now becoming more widely known. The application of the Radiovisor system to street lamps—enabling them to be automatically turned on when daylight fails and extinguished when it returns—is familiar. The system has the advantage of coming into action at once in the event of a fog or other cause of premature darkness. Quite recently Radiovisor Lighting Units have been installed to control pilot lamps in streets for burning during the midnight hours, after the main lamps have been switched off. This is specially advantageous when the main lamps are controlled in groups. The system has, however, many other applications—for instance in counting persons or vehicles passing a certain spot or limiting the density of smoke in factory chimneys. In either case the method is the same. The operation of the ray of light (visible or invisible) operates a sensitive cell and brings the controlling mechanism into action. The technical details of the system are explained very fully in the Raycraft Book, a little publication which may be new to our readers and from which the accompanying picture of a projector is taken.

# WHERE TO BUY

## A DIRECTORY OF LIGHTING EQUIPMENT




We invite applications for spaces in this new section of the journal. Particulars of terms for each space (approx. 1 inch deep and 3¼ inches wide) are given below.

These terms are equivalent to **half our ordinary advertising rates**, but not less than 12 successive monthly insertions can be accepted on this basis, and amounts are payable in advance.

Payment for an advertisement in this section entitles the advertiser to receive *Light and Lighting* during the period of the contract.

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*New Catalogue on application*

Fittings manufactured to Architects' Specifications

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**Seamless Steel Lighting Standards**

*for all requirements*

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**BI-MULTI AND MULTIPLANE REFLECTORS**

Lanterns, Brackets, Columns, Switch and Fuse Boxes, etc., FOR STREET LIGHTING

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*Cast Iron Columns* *Street Lanterns*
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## Index to "Where to Buy"



*N.B.—The numbers are those attached to individual entries in the Directory (See pp. 64-66.)*

# FIVE REASONS FOR BUYING

# MAZDA

GASFILLED
**COILED-COIL**
**LAMPS**
WITH THE WONDERFUL
NON-SAG FILAMENT


1. Mazda Lamps are made throughout from the finest materials.
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4. Mazda Lamps are individually tested before leaving the factory to ensure perfect satisfaction to every Mazda user.
5. Mazda Coiled-Coil Lamps give up to 20% more light than ordinary gasfilled lamps without extra cost.

3613

MADE IN ENGLAND BY THE BRITISH THOMSON-HOUSTON CO., LTD.

The Drawing Office by Daylight.

# An Interesting Drawing Office Installation

The efficient illumination of drawing offices, while presenting no great difficulties to the trained illuminating engineer, is sometimes apt to prove a problem to the uninitiated. High intensity combined with perfect diffusion is, of course, essential, but there are often special local requirements which must not be overlooked.

Messrs. Vickers (Aviation), Ltd., the famous aeronautical designers and aircraft manufacturers of Weybridge, Surrey, are to be complimented on a highly successful, if somewhat unusual, scheme for the artificial lighting of their drawing offices.

In their case the position of drawing boards and draughtsmen, the absence of a white ceiling, and the closely detailed character of the work, necessitated a high intensity of directional light without sacrificing or even affecting the perfect diffusion so necessary to this class of work.

The problem was solved by utilising Benjamin Saaflux Parabolic Angle Reflectors, equipped with a special opal glass visor front, and so fixed that the directional, but diffused, light falls on each board from the front and left side.

Thus, all objectionable shadows from squares, instruments, etc., are avoided, and the draughtsmen can work under artificial lighting conditions which are more efficient than daylight values often met with inside drawing offices.

The two illustrations, here reproduced by the courtesy of Messrs. Vickers (Aviation), Ltd., are from actual unretouched night photographs taken by the light from fittings alone. The pictures tell their own story of the excellent results obtained; but it should be mentioned that a scheme of this sort can only be really effectively employed when there is plenty of head-room available, otherwise the fittings would hang too low.

The Same Interior by Artificial Light.

In locations where the head-room is limited the Benjamin Glassteel Diffuser, correctly installed, gives excellent results. We may add that the Benjamin Electric, Ltd., are always pleased to advise on all drawing office lighting problems without obligation or cost.

This type of parabolic reflector is a standard Benjamin production, and its use for illuminating large vertical surfaces and inclined surfaces is familiar. The above note, however, describes a somewhat novel application for the lighting of a drawing office.

## Architects' Conference on Lighting

As we go to Press we receive a notice of the Architects' Conference on Lighting, which opened on Wednesday, January 29, at the E.L.M.A. Lighting Service Bureau (2, Savoy-hill, W.C.2). Mr. W. J. Jones has kindly favoured us with a copy of his opening paper, from which we hope to quote in our next issue. The excellent plan is again followed of arranging for one or more architects to open each discussion. Forthcoming meetings are on February 5, 12, and 19, at 7.30 p.m.

# UP-TO-DATE WITH GAS

*Corporation Street, Birmingham, under the new system of Gas Lighting.*

*New Street, Birmingham, under the new system of Gas Lighting.*

## means A1 light for Birmingham

When Birmingham resolved to provide conditions of illumination corresponding to "class A" of the British Standard Specification they chose high pressure gas lamps suspended over the carriageway by wire cables spanning the street and attached to buildings on each side.

The respective widths of the carriageways in New Street and Corporation Street are 35 ft. and 40 ft. Pairs of lamps, each yielding about 3,000 c.p., are mounted 7 ft. apart, and spaced at intervals of 70 ft. The height of the lamps above the surface of the roadway is 26 ft. 6 in.

*Please write for a copy of our street lighting booklet "To every public man and woman" — it's free — to the address below.*

THE BRITISH COMMERCIAL GAS ASSOCIATION, *28, Grosvenor Gardens, London, S.W.1.*

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